WHAT IS CLAIMED IS:

1. A method of processing a head slider having a bearing surface, the method comprising:

(a) selecting a material stress pattern to be applied to a working surface of the slider based on measured and desired contour shape parameters in a plurality of localized areas on the bearing surface, wherein the measured contour shape parameter within a first of the plurality of localized areas is weighted more heavily than those within the other localized areas.

2. The method of claim 1 and further comprising:

(b) measuring a plurality of contour shape parameters within each of the plurality of localized areas on the bearing surface.

3. The method of claim 2 wherein step (b) comprises:

(b)(1) measuring slopes of the localized area along first and second orthogonal axes within each of the localized areas; and

(b)(2) measuring a height of a point on the bearing surface within each of the localized areas.

4. The method of claim 1 wherein step (a) comprises:

(a)(1) forming a mathematical expression as a function of an overall deviation of a shape of the bearing surface from a

desired shape based on local deviations of each of the contour shape parameters from the desired shape parameters within the corresponding localized areas; and

(a)(2) selecting the material stress pattern from a plurality of stress patterns in order to minimize the mathematical expression in (a)(1).

5. The method of claim 4 wherein (a)(1) comprises expressing the overall deviation as a weighted sum of squares of the local deviations.

6. The method of claim 4 and further comprising:

(a)(3) for each of the plurality of stress patterns, generating the local deviations of each of the shape parameters based on the measured shape parameter within the corresponding localized area and a predicted response of that shape parameter to the stress pattern.

7. The method of claim 1 wherein step (a)(1) comprises forming the mathematical expression as a further function a predicted deviation of a fly characteristic of the slider from a desired fly characteristic.

8. The method of claim 7 and further comprising:

(a)(3) for each of the plurality of stress patterns, generating the predicted deviation of the fly characteristic as a function of the shape parameters within each of the plurality of

localized areas and the sensitivities of the fly characteristic to the shape parameters.

9. The method of claim 7 wherein step (a)(1) comprises forming the mathematical expression as a further function predicted deviations of a plurality of fly characteristics of the slider from a plurality of corresponding desired fly characteristics.

10. The method of claim 9 wherein at least one of the predicted deviations of the plurality of fly characteristics is weighted more heavily than the other of the predicted deviations of the plurality of fly characteristics.

11. The method of claim 9 wherein the plurality of fly characteristics comprises fly height and pitch and roll attitudes of the slider.

12. The method of claim 1 and further comprising:

(b) applying the material stress pattern to the working surface of the slider to induce a change in the shape parameters within the plurality of localized areas.

13. The method of claim 1 wherein the slider carries a transducer within the first localized area, which has the shape parameter that is weighted more heavily than the shape parameters within the other localized areas.

14. A method of processing a head slider having a bearing surface, the method comprising:

(a) receiving a measure of a contour shape parameter within each of a plurality of localized areas on the bearing surface;

(b) receiving a corresponding desired contour shape parameter for each of the plurality of localized areas;

(c) forming a mathematical expression as a function of an overall deviation of a shape of the bearing surface from a desired shape based on local deviations of the contour shape parameters from the corresponding desired shape parameters; and

(d) selecting a material stress pattern to be applied to a working surface of the slider from a plurality of stress patterns in order to reduce the mathematical expression.

15. The method of claim 14 and further comprising:

(e) applying the material stress pattern selected in (d) to the working surface of the slider to induce a localized shape change within the plurality of localized areas.

16. The method of claim 14 wherein the measured contour shape parameter within a first of the plurality of localized areas is weighted more heavily than those within the other localized areas during selection of the material stress pattern in (d).

17. The method of claim 14 wherein (a) comprises receiving a measure of a plurality of contour shape parameters within each of the plurality of localized areas on the bearing surface.

18. The method of claim 17 wherein the plurality of contour shape parameters comprises:

slope of the localized area along a first axis;

slope of the localized area along a second axis, which is orthogonal to the first axis; and

height of a point on the bearing surface within the corresponding localized area.

19. The method of claim 14 wherein (c) comprises expressing the overall deviation as a weighted sum of squares of the local deviations.

20. The method of claim 19 and further comprising:

(e) for each of the plurality of stress patterns, generating the local deviations of each of the measured shape parameters based on the measured shape parameter based on a predicted response of that shape parameter to the stress pattern.

21. The method of claim 14 wherein (c) comprises forming the mathematical expression as a further function a predicted deviation of a fly characteristic of the slider from a desired fly characteristic.

22. The method of claim 21 and further comprising:

(e) for each of the plurality of stress patterns, generating the predicted deviation of the fly characteristic as a function of predicted responses of the measured shape parameters within each of the plurality of localized areas and the sensitivities of the fly characteristic to the predicted responses.

23. The method of claim 21 wherein (c) comprises forming the mathematical expression as a further function predicted deviations of a plurality of fly characteristics of the slider from a plurality of corresponding desired fly characteristics.

24. The method of claim 21 wherein at least one of the predicted deviations of the plurality of fly characteristics is weighted more heavily than the other of the predicted deviations of the plurality of fly characteristics during selection of the material stress pattern in (d).

25. The method of claim 23 wherein the plurality of fly characteristics comprises fly height and pitch and roll attitudes of the slider.

26. An apparatus for processing a head slider having a bearing surface, the apparatus comprising:

means for selecting a material stress pattern to be applied to a working surface of the slider based on measured and desired contour shape parameters in a plurality of localized areas on the bearing surface, wherein the measured contour shape parameter within a first of the plurality of localized areas is weighted more heavily than those within the other localized areas; and

means for applying the material stress pattern to the working surface of the slider to induce a localized shape change in the plurality of localized areas.

27. A method of characterizing the topological shape of a surface, the method comprising:

(a) measuring heights along the surface to produce height measurement data;

(b) fitting a target curved surface equation having at least one target shape characteristic to the height measurement data to produce a fitted target surface equation;

(c) determine deviation of the height measurement data from the fitted target surface equation to produce deviation data; and

(d) fitting a deviation surface equation to the deviation data, wherein the deviation surface equation characterizes the topological shape relative to the target surface equation.

28. The method of claim 27 wherein (d) comprises fitting a plane to the deviation data, wherein the plane comprises a first coefficient representing planar offset in a vertical direction of the fitted plane from the target curved surface equation, and second and third coefficients representing offsets in slope along orthogonal X and Y axes, respectively, from the target curved surface equation.

29. The method of claim 28 wherein the surface comprises a plurality of localized regions and wherein (d) comprises, for each of the localized regions, fitting a corresponding plane to the deviation data within the localized region only, wherein the first coefficient of the corresponding plane represents an average planar offset in the vertical direction from a target height of the target curved surface equation within the localized region, and the second and third coefficients of the corresponding plane represent average offsets in slope along the orthogonal X and Y axes, respectively, from respective target slopes of the target curved surface equation within the localized region.

30. The method of claim 29 wherein (d) further comprises, for each localized region, defining a local coordinate system having the X and Y axes and an origin, placing the origin at a location within the localized region, and fitting the corresponding plane within the local coordinate system.

31. The method of claim 27 wherein the target curved surface equation comprises a target crown curvature shape characteristic along an X-axis and a target cross curvature shape characteristic along a Y-axis, which is orthogonal to the X-axis.

32. The method of claim 31 wherein the target curved surface equation further comprises a target twist curvature shape characteristic about the X and Y axes.

33. The method of claim 32 wherein the target curved surface equation is a quadratic polynomial having fixed coefficients, which are functions of the target crown, cross and twist shape characteristics, and unknown coefficients representing vertical offset and tilt about the X and Y axes of the fitted target surface equation.

34. The method of claim 27 wherein the surface comprises a bearing surface on a data head that is supported relative to a data storage medium and wherein the method further comprises:

(e) modeling a flying characteristic of the data head relative to the data storage medium as a function of the target surface equation and coefficients of the deviation surface equation.

35. An apparatus for characterizing the topological shape of a bearing surface on a disc head slider, the apparatus comprising:

means for measuring heights along the bearing surface to produce height measurement data;

means for fitting a target curved surface equation having at least one target shape characteristic to the measurement data to produce a fitted target surface equation;

means for determine deviation of the height measurement data from the fitted target surface equation to produce deviation data; and

means for fitting a deviation surface equation to the deviation data, wherein the deviation surface equation characterizes the topological shape relative to the target surface equation.

36. The apparatus of claim 35 wherein the means for fitting a deviation surface equation to the deviation data comprises means for fitting a plane to the deviation data, wherein the plane comprises a first coefficient representing planar offset in a vertical direction of the fitted plane from the target curved surface equation, and second and third coefficients representing offsets in slope along orthogonal X and Y axes, respectively, from the target curved surface equation.

37. The apparatus of claim 36 wherein the bearing surface comprises a plurality of localized regions and wherein the means for fitting a deviation surface equation comprises, for each of the localized regions, means for fitting a corresponding plane to the deviation data within the localized region only, wherein the first coefficient of the corresponding

plane represents an average planar offset in the vertical direction from a target height of the target curved surface equation within the localized region, and the second and third coefficients of the corresponding plane represent average offsets in slope along the orthogonal X and Y axes, respectively, from respective target slopes of the target curved surface equation within the localized region.

38. The apparatus of claim 37 wherein the means for fitting a deviation surface equation to the deviation data further comprises, for each localized region, means for defining a local coordinate system having the X and Y axes and an origin, placing the origin at a location within the localized region, and fitting the corresponding plane within the local coordinate system.

39. The apparatus of claim 35 wherein the target curved surface equation comprises a target crown curvature shape characteristic along an X-axis of the bearing surface and a target cross curvature shape characteristic along a Y-axis of the bearing surface, which is orthogonal to the X-axis.

40. The apparatus of claim 39 wherein the target curved surface equation further comprises a target twist curvature shape characteristic for the bearing surface about the X and Y axes.

41. The apparatus of claim 40 wherein the target curved surface equation is a quadratic polynomial having fixed coefficients, which are functions of the target crown, cross and twist shape characteristics, and unknown coefficients representing vertical offset and tilt about the X and Y axes of the fitted target surface equation.

42. The apparatus of claim 35 and further comprising means for modeling a flying characteristic of the disc head slider relative to a data storage medium as a function of the target surface equation and coefficients of the deviation surface equation.